Back to Basics and Oracle Database 23ai

Strategy and Roadmap

Speakers:

Håkan Råström (Stockholm)

Anders Lundmark (Malmö)

Technology Account Engineers

Oracle Technology Software, Nordics

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, timing, and pricing of any features or functionality described for Oracle's products may change and remains at the sole discretion of Oracle Corporation.

Copyright © 2023, Oracle and/or its affiliates

ORACLE

Databasens dag

Malmö / Stockholm

Topics

- Introduction
- Oracle Database and Vision
- JSON and Graph
- Oracle AI Vector Search
- New in Oracle Database 23ai

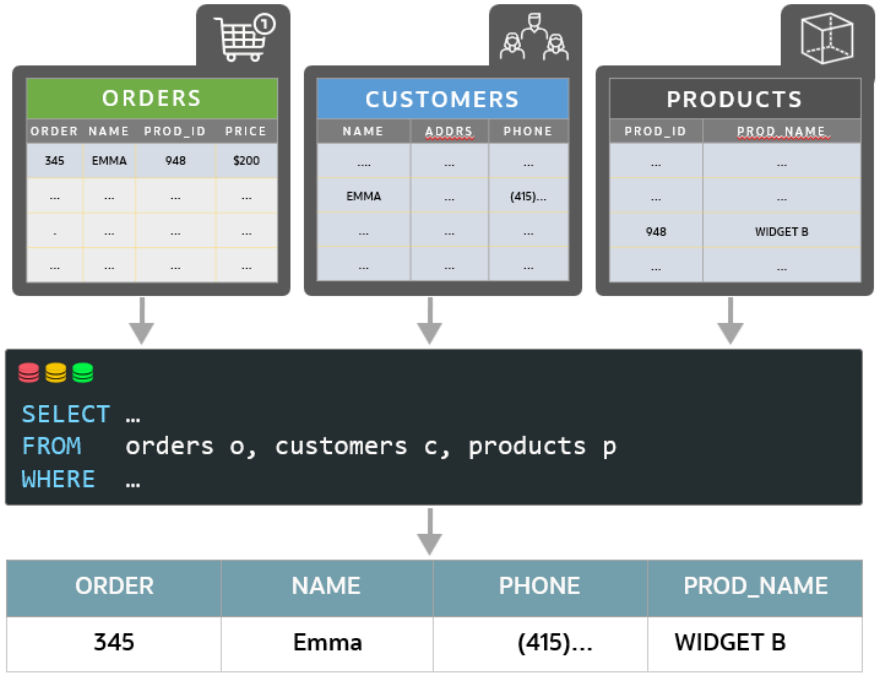
What is a Database?

- An organized **collection of data**
- **Software** that interacts with applications, end users & data
- Many users can **access the data** at the same time
- **Capture, analyze & manipulate** the data

Database Types

Relational

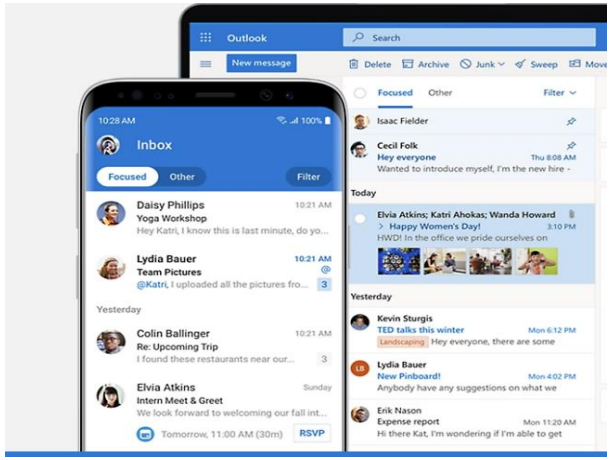
- Relational **model & tables** to structure data
- Data stored in **rows and columns**
- **SQL** – standard language to talk to database
- Easy to **analyse and query**
- **~20%** data can be stored in relational DB
- **Mission critical business data**



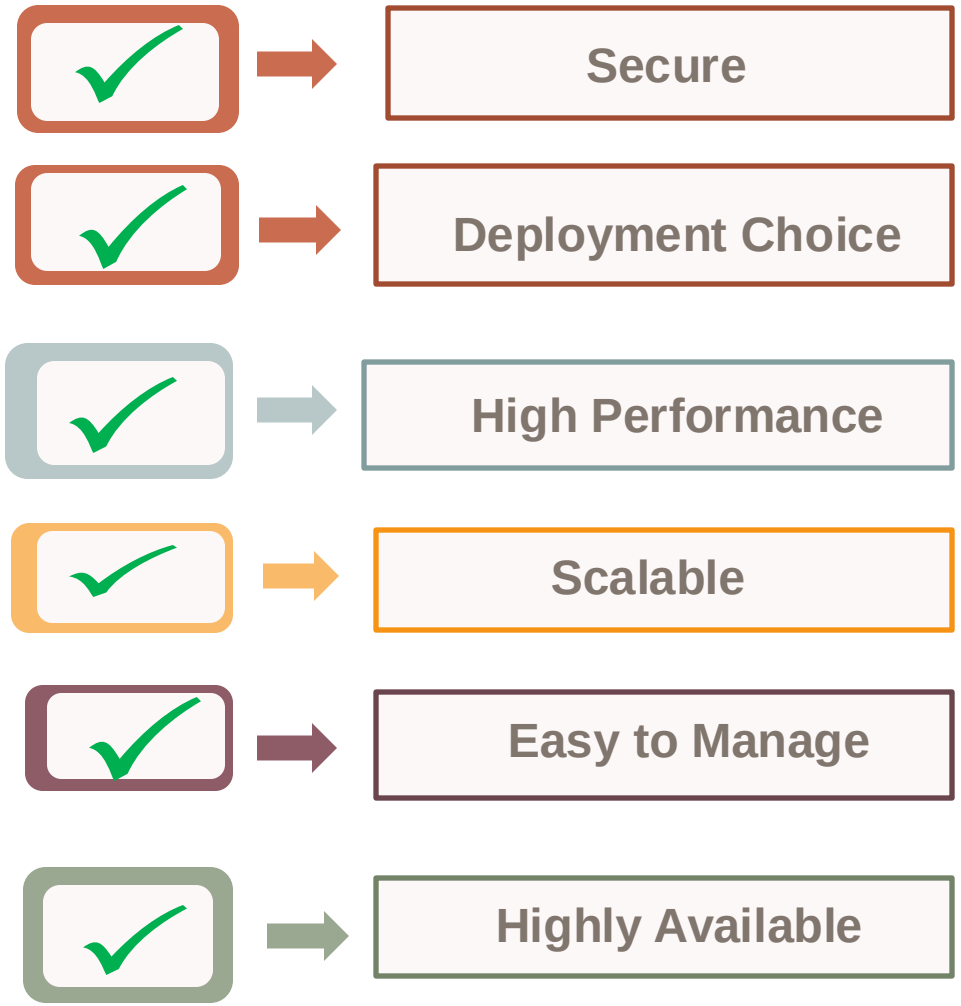
Database Types

Unstructured

- Data that **cannot be easily structured** into data model
- **Text files, emails, videos, images, spatial data**
- **Difficult to analyse** and store
- **Difficult to query** in a standardized fashion
- **80%** of data generated in an enterprise



Key Database Requirements



Mission critical data needs to be stored securely with a high level of access control

Customers want the choice to deploy databases either on premise, in the cloud or hybrid cloud depending on their needs.

Database needs to supply data quickly to application and end user without delays

During periods of demand the database needs the ability to add additional capacity seamlessly

Keeping the database up and running should take minimal effort and man-power

Database operates continuously with no interruptions in service. Can handle both planning and unplanned downtime.

What Are Specialized Databases?

Specializing in one type of data/ one single purpose

What is driving the growth of specialized databases?

- New methods of developing applications
- New types of data
- New cloud platforms

Drawback of Specialised Database

- All require **different skillsets**
- **Difficult to maintain** & manage
- **Difficult to share** data
- **Slow pace of innovation**
- **Cost** overhead

Document (JSON)

redis

mongoDB.

Spatial & Graph

Amazon Neptune

Neo4j Graph

Vector

Pinecone

chroma

Data Warehouse

snowflake

Amazon RedShift

Databricks Lake House

Distributed

yugabyteDB

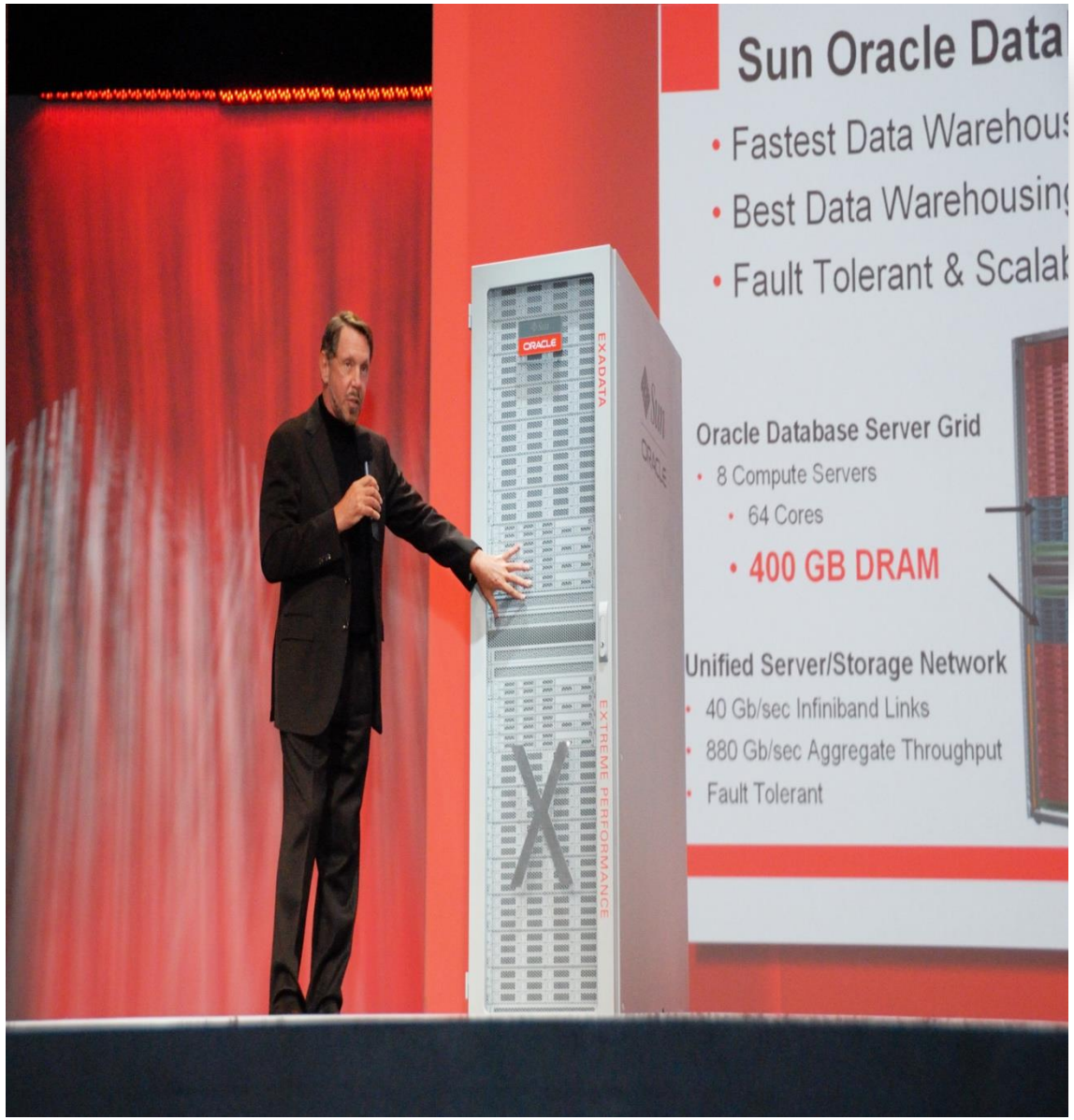
Google Cloud Spanner

Relational

PostgreSQL

History of Oracle Database

- In development since **1977**
- A relational database, **DBR2 First Oracle product** to market
- Market leading DB innovation with RAC, Data Guard, Advanced Security , Multitenant
- Exadata first release in 2008
- **Database software & Oracle Hardware engineered to work well together**
- Drive for innovation continues year on year



Oracle Database Vision

Make modern apps and analytics
easy to develop and run
for all use cases at any scale

With Generative AI (LLM)

Make modern apps and analytics
easy to **generate** and run
for all use cases at any scale

How we deliver the Vision

Complete and Simple Platform for All Data Management Needs

Converged Database

Complete: all modern data types, workloads, and development styles

Simple: Add a SQL Statement, not a database to support any need of modern applications

Running on

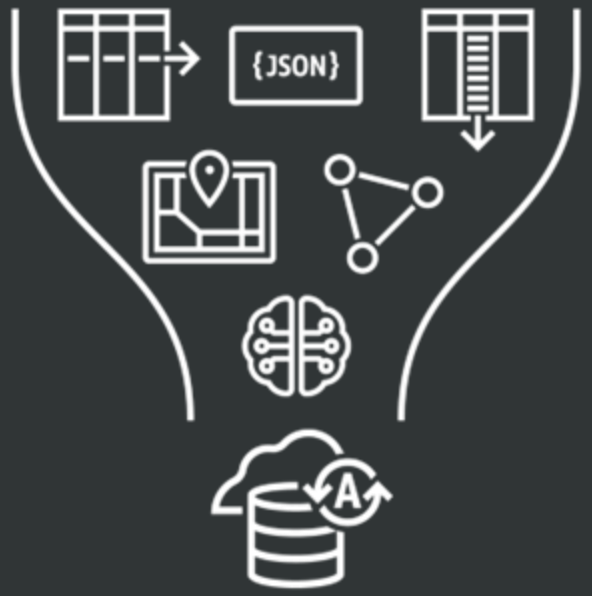
Autonomous Database

Powerful: All the benefits of converged database running on Exadata

Simple: Fully-managed cloud service

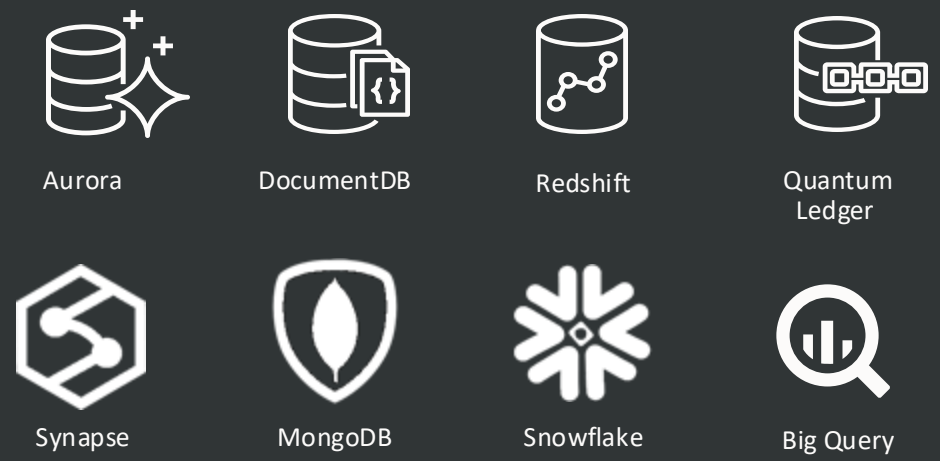
Comparing Database Strategies

Run converged, open, SQL Database



Developers and IT focus on Innovation

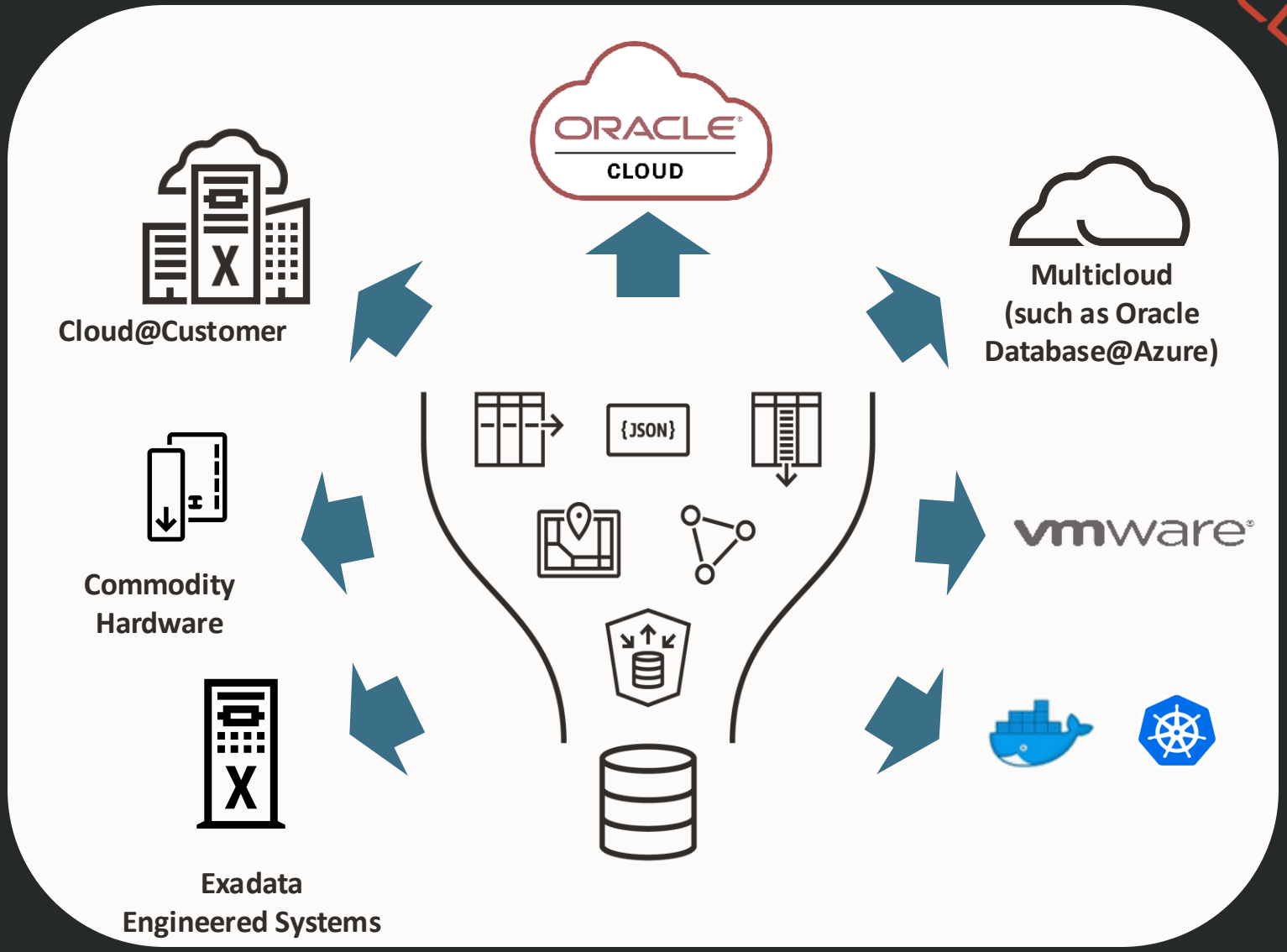
Instead of single-use proprietary databases



Developers and IT focus on Integration

Oracle Database Deployment Choices

Develop and deploy Oracle anywhere – extreme portability

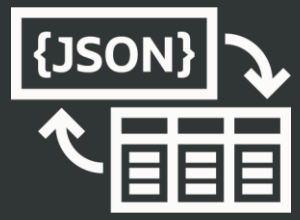


Same database, same skills

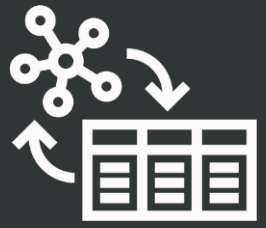
Next Generation Converged Database – Database 23ai

Unifies JSON Document, Graph, and AI with Relational Models

Unification of
JSON and Relational



Unification of
Graph and Relational



Unification of
AI and Databases

Oracle AI Vector Search
in Oracle Database 23ai

AI Vector Search

Breakthrough technology that **simplifies** and **optimizes** searching for documents, images, patterns, and data that have similar semantics

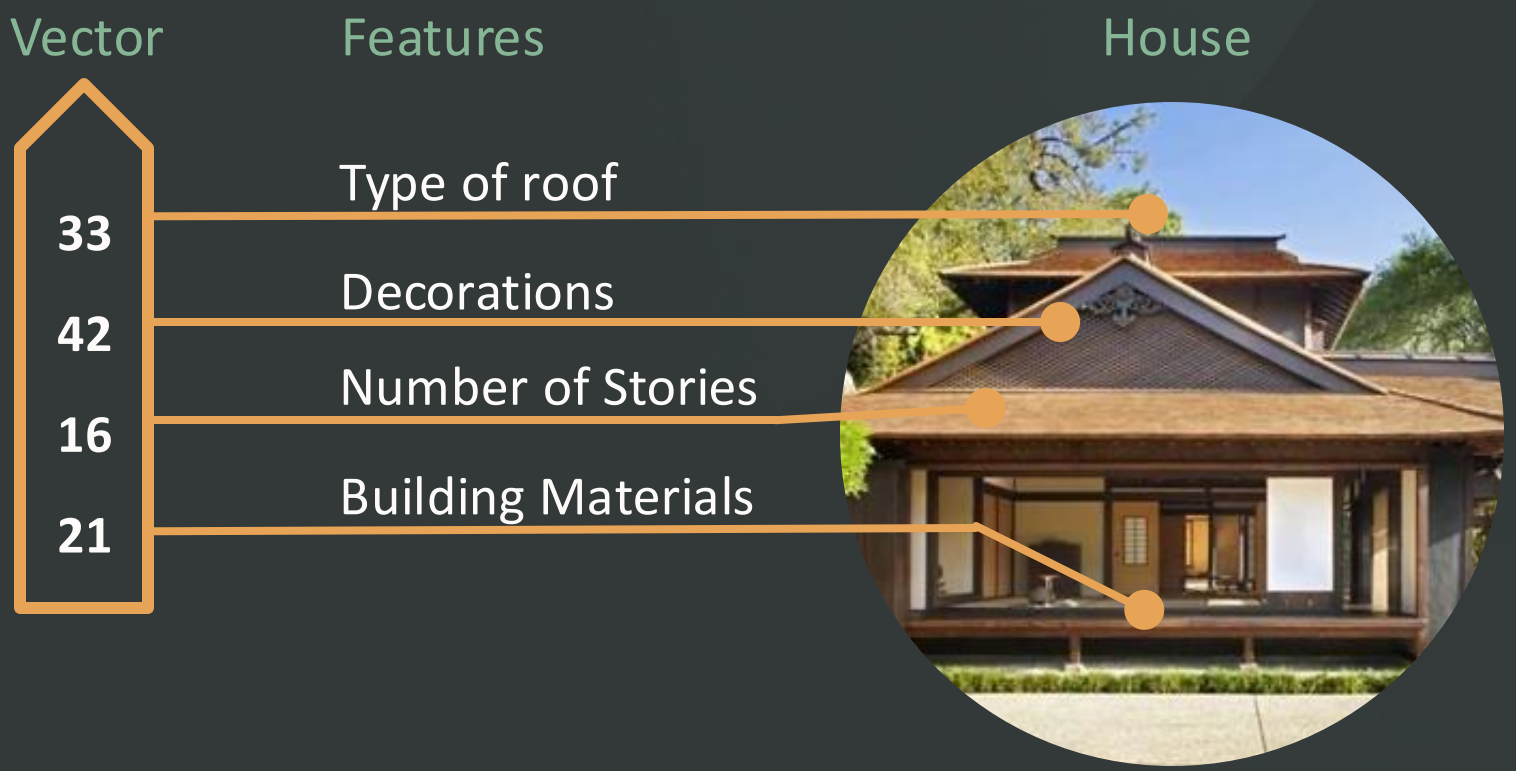
Oracle Database 23ai introduces a new data type called Vectors

Vectors represent the content (semantics) inside images, documents, data, etc.

A vector is a sequence of numbers, called dimensions, used to capture the important “features” of the data

Vectors represent the semantic content of data, not the actual words in a document or pixels in an image

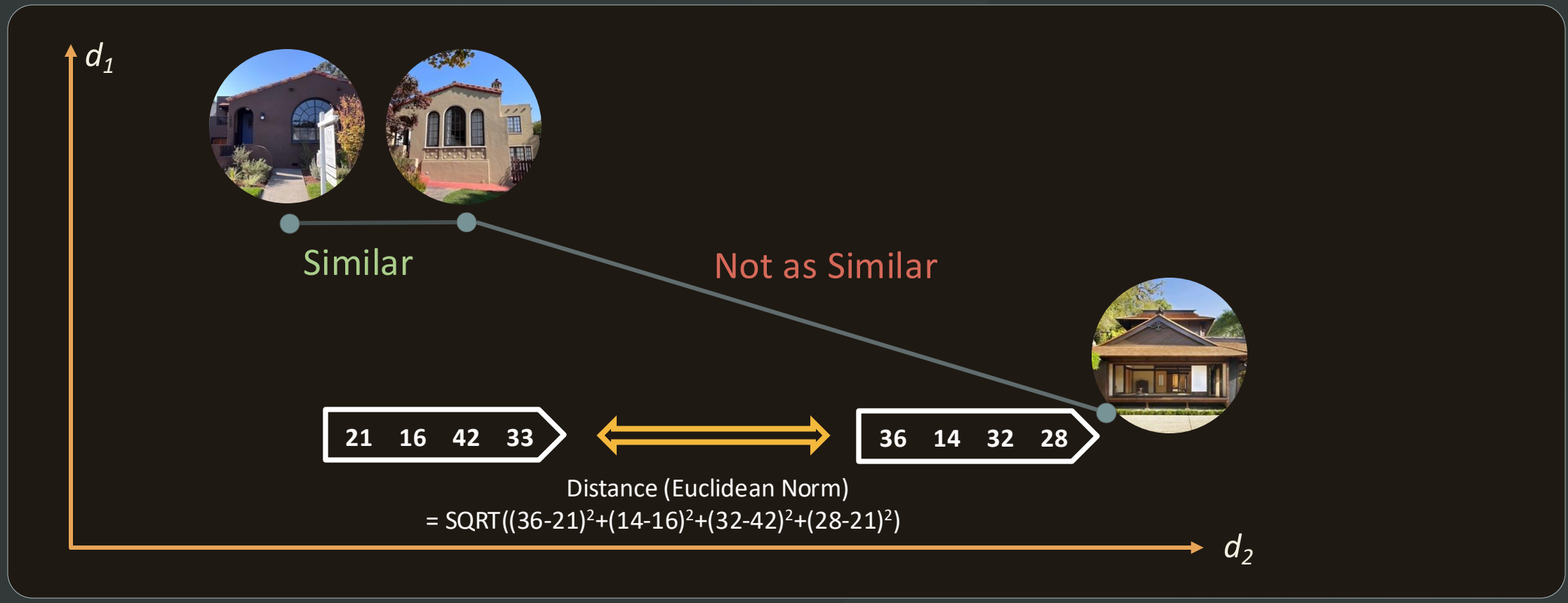
For example, the features of a house image could be:



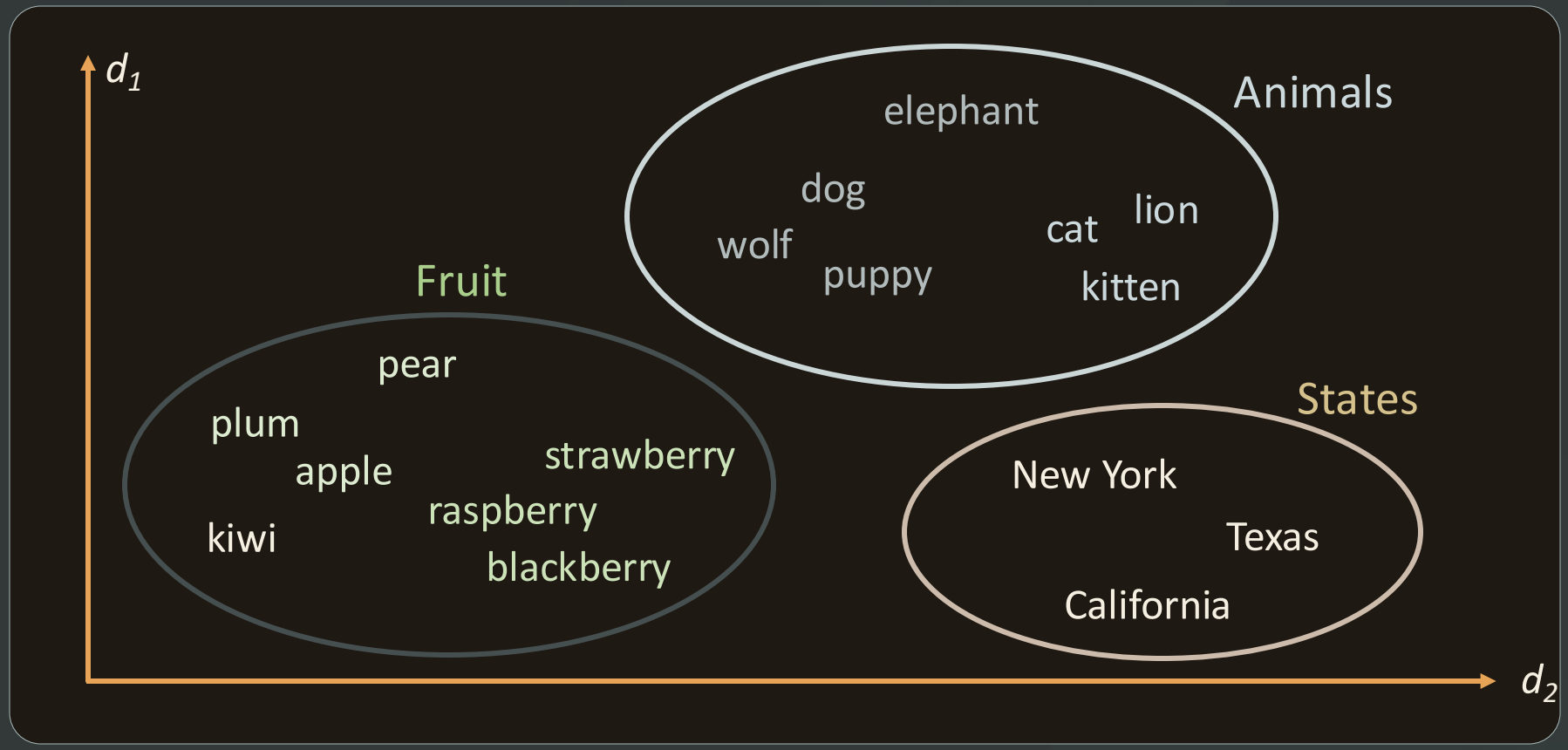
Each dimension (number), represents a feature of the house

Note: Features are often chosen by ML algorithms and are not as simple as shown here

The distance between the vectors is proportional to their semantic similarity



Word similarity works the same way
Word vectors that are near each other are semantically similar



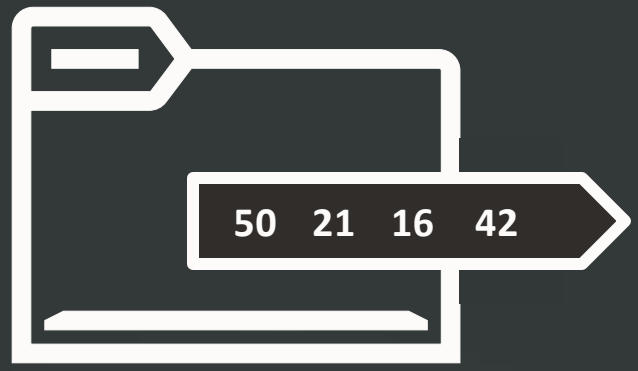
Documents also work the same way

Document vectors that represent similar content are closer in distance

One way to run a combined search is to continuously send your business data to a specialized vector store

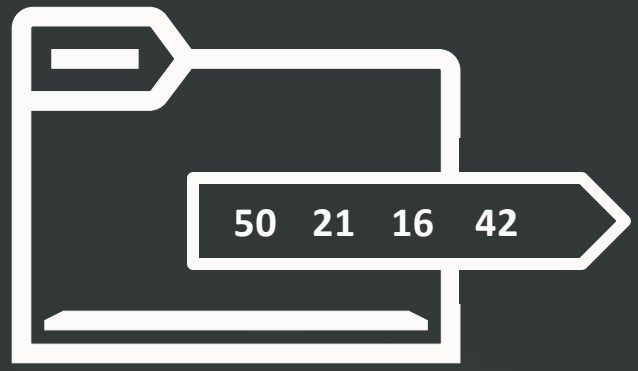
Business Database

User and Product Data



Vector Store

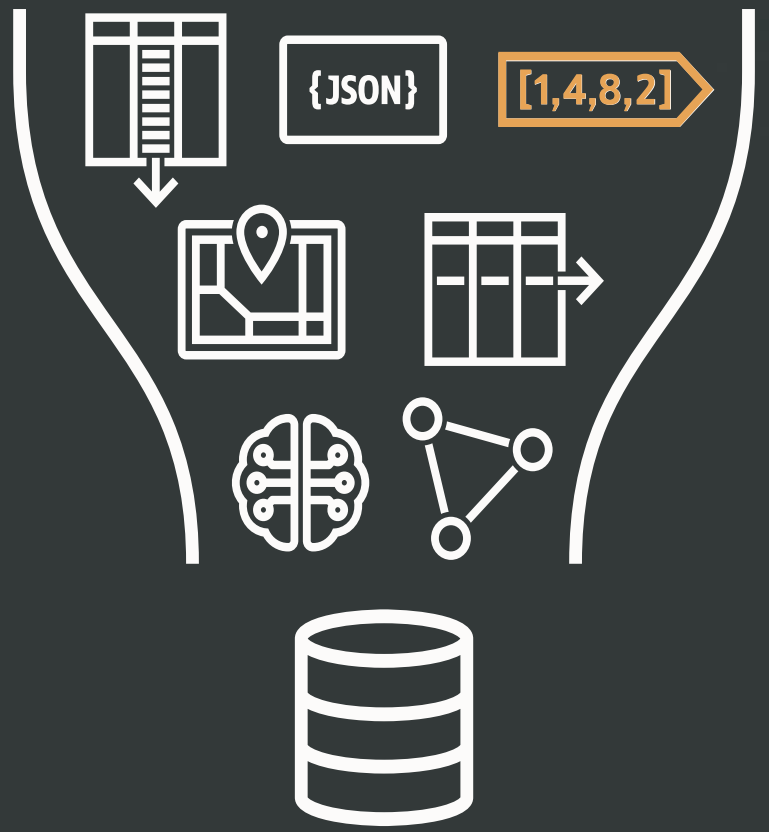
The business data that is relevant to a question varies widely



You need to send lots of business data since you can't predict the question

Dedicated vector databases are not good at searching or securing business data

A better solution is to store and search both types of data together



Converged Database

That's why we added AI Vector Search to the leading repository of business data – Oracle

- Users can now combine business data and vectors to answering a question
- Eliminates the need to move and synchronize data, manage multiple products, etc.

Finding a good match requires combining semantic picture search with searches on business data including:

- Customer data such as the customer's preferred city and budget
- Product data such as houses available for sale in each city and their price

This is easy with Oracle Database 23ai

You can now run queries that combine AI Vector Search with business data about customers and products

Ultra simple and powerful

Combines customer data, product data, and AI search in 6 lines of SQL!

All data is fully consistent

Single integrated solution

Find houses that are similar to this picture and match the customer's preferred city and budget

```
SELECT …
FROM   house_for_sale
WHERE  price <= (SELECT budget      FROM customer …)
AND    city  in (SELECT search_city FROM customer …)
ORDER BY vector_distance(for_sale_house_vector, :input_vector)
FETCH FIRST 10 ROWS ONLY;
```

What’s new in Oracle Database 23ai?

Next-Generation Converged Database

Over 300 major new features plus thousands of enhancements

Oracle AI Vector Search is Fully Integrated

Seamless Integration with core database features for enterprise-grade performance and reliability

RAC

Sharding

Partitioning

Exadata

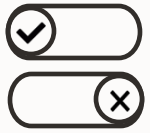
Transactions

Parallel Execution

Analytics

Security

Oracle Database 23ai – Additional Features For App Dev



Boolean Datatype

A more intuitive way of storing and manipulating logical values within the database

```
CREATE TABLE customers(
         cust_id number,
         Active boolean);

SELECT cust_id
FROM customers
WHERE active;
```

JavaScript Stored Procedures

JavaScript joins PL/SQL & Java as first-class server-side dev languages

Executed by our fast Multilingual Engine (MLE), powered by GraalVM

Reduces the number of roundtrips to the database

Wider Tables

Support for up to 4096 columns per table

Simplifies development of applications that need large numbers of attributes such as for ML and IoT workloads

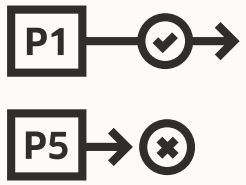
```
ALTER SYSTEM SET
max_columns = EXTENDED;
```

Lock-free Column Value Reservations

Allows applications to reserve part of a value in a column without locking the row

For example, reserve part of a bank account balance or reserve an item in inventory without locking out all other operations on the bank account or item

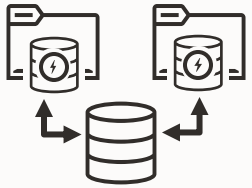
Oracle Database 23ai Mission Critical Apps Enhancements



Priority Transactions

Automatically prioritizes high-priority transactions over low-priority transactions

Low-priority transactions that block high-priority transactions will be automatically aborted

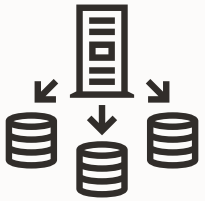


True Cache

A (nearly) disk-less Oracle database instance that is deployed as a cache

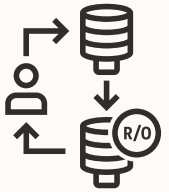
Unlike conventional mid-tier caches such as Redis, data in True Cache is automatically updated

ANY SQL Query can be transparently directed to the cache instead of the database



Active-Active Globally Distributed Database

Database sharding with Raft replication supports applications that require low latency and high availability plus helps meet data sovereignty requirements



Readable Per-PDB Standby

Per-PDB standby databases can now be opened for read-only workloads

Improving production database performance by offloading resource-intensive backup and reporting operations to standby systems

Oracle Database 23ai Security Enhancements

In-Database Firewall

An easy-to-use firewall solution, with minimal perf and operational overhead

Built-in to ensure it cannot be bypassed

Protection against attacks by monitoring and blocking “unauthorized SQL” and SQL injection attacks

Read-Only Users

Users may be created as, or altered to, READ ONLY status (default READ WRITE)

```
ALTER USER joe
READ ONLY;
```

Read-only users can not insert or update data, nor can they create database objects

Developer Role

It’s complex to grant all the privileges developers need to create, debug, etc.

Now it’s simple using the new DB_DEVELOPER_ROLE :

```
GRANT DB_DEVELOPER_ROLE
TO    scott;
```

Schema Privileges

Managing the privileges on all the tables, views, and procedures used by an app can be tricky

Now this is simple using GRANT on a schema

```
GRANT SELECT ANY TABLE
   ON SCHEMA sales
   TO mary;
```

Oracle Database 23ai – The Next Long Term Support Release

Data Use Case Domains

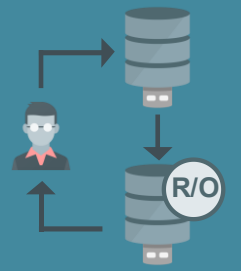
Boolean Datatype

Real-time SQL Plan Management

JSON Schema

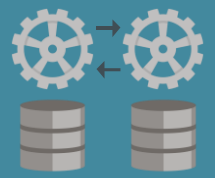
Oracle Database 23ai

Bring AI to your data



Readable PDB Standby

Property Graphs

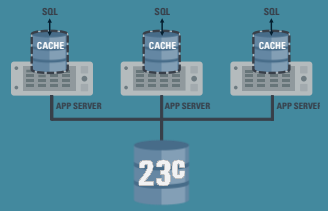


Microservice Sagas

JSON / Relational Duality

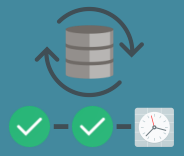
AI Vector Search

True Cache



SQL Firewall

Priority Transactions



Rolling Patching

JS Stored Procedures

Developer Role

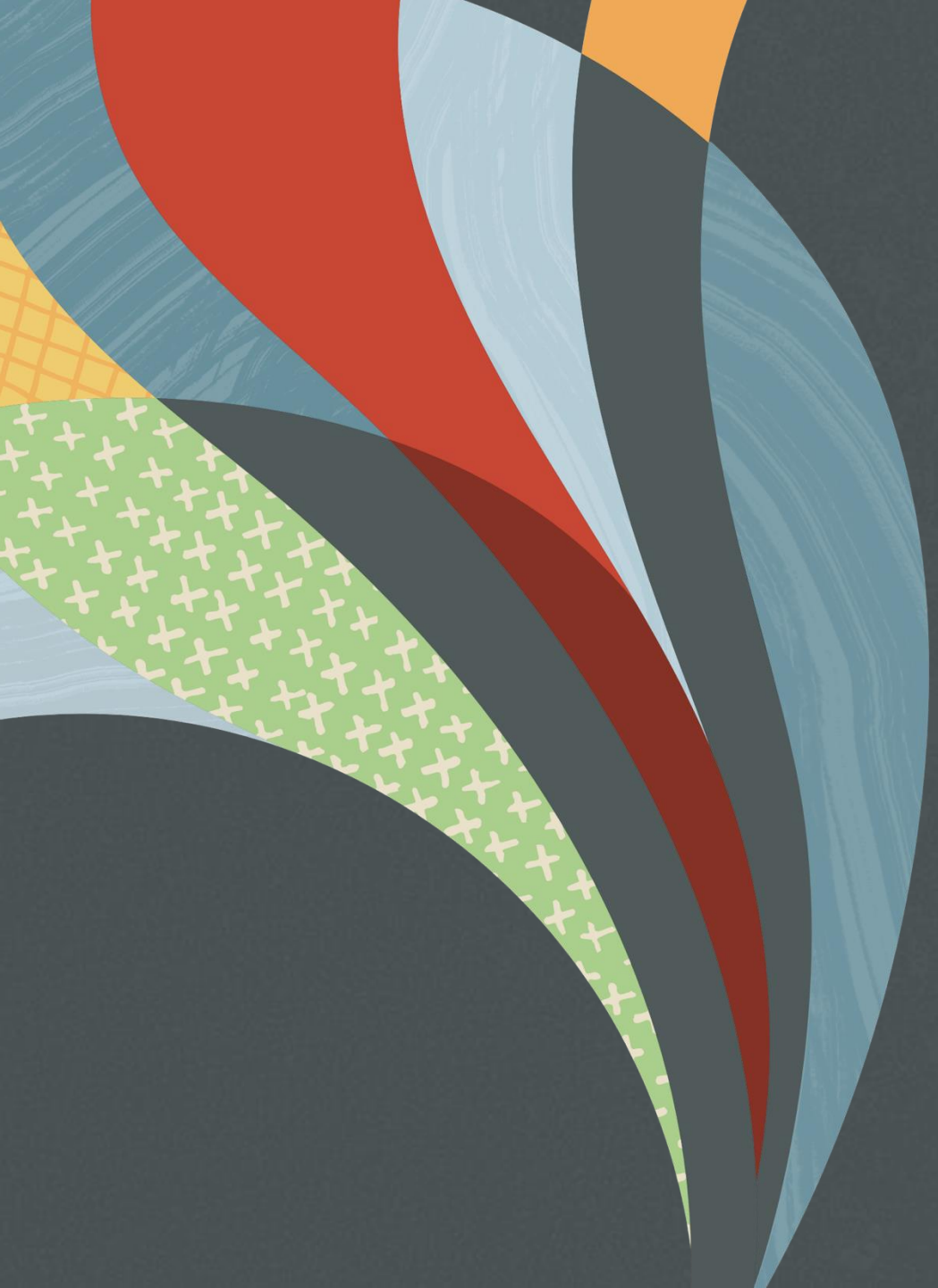
Shrink Tablespace

Schema Privileges

Globally Distributed Database

Projected Database Release and Support Timeline

- Innovation Release - 2 years of Premier Support, and no Extended Support
- Long Term Release - 5 years of Premier Support, and 3 years of Extended Support
- Always refer to MOS Note: Release Schedule of Current Database Releases (Doc ID 742060.1)



Thanks for joining this session

Checkout Oracle Database 23ai
http://www.oracle.com/database/23ai

Our mission is to help people
see data in new ways, discover insights,
unlock endless possibilities.